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(54) Title: CARD CONNECTOR WITH SELECTIVE CARD STOP MECHANISM

(57) Abstract: A stop mechanism is disclosed for selectively restricting insertion of a card into a card slot of a card connector. The stop mechanism is positioned in the card slot along a path of insertion of the card into the card slot. A card having a thickness less than a predetermined thickness engages a stop portion of the stop mechanism when inserted into the card slot, preventing further insertion of the card past the stop mechanism. A card having a thickness greater than the predetermined thickness contacts an engagement portion of the stop mechanism when inserted into the card slot, producing a movement of the stop mechanism out of the path of card insertion.

CARD CONNECTOR WITH SELECTIVE CARD STOP MECHANISM

Technical Field;

The present invention relates to card connectors and, in particular, to mechanisms for restricting insertion of a card into a card slot of a card connector.

Background Art:

The functionality of items of electronic equipment, such as personal computers, portable telephones and personal digital assistants (PDA's) may be expanded by mounting various types of electronic cards thereon. Various components, such as a CPU (Central Processing Unit) or a memory IC (integrated circuit) may be incorporated into the cards.

10 Examples of such cards are a PCMCIA (Personal Computer Memory Card International Association) card, a SIM (Subscriber Identify Module) card, a MMC (Multi Media Card), a SD (Super Density) Card, and a SMART card. These cards may vary considerably in thickness, some cards being relatively thin and some cards being relatively thicker.

Card connectors have been developed which have two or more card slots, to
15 accommodate the connection of multiple cards to the item of electronic equipment. These connectors may be designed to receive two cards having different thicknesses. FIG. 16 shows an example of such a card connector 1, wherein cards differing in thickness are inserted into card slots 2A and 2B arranged in parallel. A thick card is inserted into card slot 2A and a thin card is inserted into card slot 2B. Card slot 2A includes a pair of guide grooves 7 which face
20 each other in an opposed manner, and card slot 2B also includes a pair of guide grooves 8 facing each other in an opposed manner. By bringing side peripheries (not shown) of the cards into contact with front ends of respective grooves, 7 and 8 and by urging the cards in the direction of the card connector, the cards can be inserted into card connector 1.

A card connector designed to mate with a relatively thick card must have a card slot
25 sized to receive the thicker card. Card connectors generally incorporate a set of electrical contacts, or pins, positioned at a mating end of the card slot. These pins are positioned so as to engage a complementary receptacle connector mounted in the card when the card is fully inserted into the card slot. As a thicker card may have a thickness much greater than a relatively thin card, the opening of a card slot configured to receive the thick card will also, in
30 general, be large enough to permit insertion of the thin card into the card slot. However, due to its smaller thickness, the thinner card may not come into contact with interior surfaces of

the card slot designed to restrict and guide the motion of a thicker card. Thus, due to the relatively greater freedom of movement of the thinner card within the larger card slot, movement of the thinner card within the larger card slot may damage the connector pins.

A purpose of the present invention is to limit the degree to which a thinner card may be inserted into a card slot configured to receive a relatively thicker card, while still permitting full insertion of the thicker card into the card slot.

Brief Description of the Drawings:

FIG. 1 is a perspective view showing a card connector incorporating a stop mechanism according to the present invention;

FIG. 2 is a perspective view of the card connector of FIG. 1 showing a top plate removed from the connector;

FIG. 3 is a longitudinal cross-sectional view of the card connector of FIG. 1 showing insertion of a thick card into a card slot of the connector;

FIG. 4 is the longitudinal cross-sectional view of FIG. 3 showing the thick card inserted further into the card slot of the connector;

FIG. 5 is a longitudinal cross-sectional view of the card connector of FIG. 1 showing insertion of a thin card into the card slot of the connector;

FIG. 6 is the longitudinal cross-sectional view of FIG. 5 showing the thin card inserted further into the card slot of the connector;

FIG. 7 is the longitudinal cross-sectional view of FIG. 5 showing the thin card engaging a stop portion of the present invention;

FIG. 8 is the longitudinal cross-sectional view of FIG. 5 showing the thin card inserted into the card slot at an angle and engaging the stop portion of the present invention;

FIG. 9 is an edge view of the connector of FIG. 1 showing an interior of the card slots as viewed in the direction indicated by arrow IX in FIG. 1;

FIG. 10 is a partial perspective view of the connector of FIG. 5 showing insertion of the thin card into the card slot prior to engagement between the thin card and the stop portion of the present invention;

FIG. 11 is the partial perspective view of FIG. 10 showing engagement between the thin card and the stop portion of the present invention;

FIG. 12 is a perspective view showing one example of a thick card adapted for insertion into the card connector of the present invention;

FIG. 13 is an edge view of the thick card of FIG. 12 as viewed in the direction indicated by arrow XIII in FIG. 12;

FIG. 14 is the longitudinal cross-sectional view of FIG. 5 showing the thin card extending past the stop mechanism of the present invention to abut a polarizing feature incorporated into the card slot;

FIG. 15 is a longitudinal cross-sectional view showing a card connector incorporating another embodiment of the stop mechanism of the present invention; and

FIG. 16 is a perspective view of a prior art card connector having two card slots.

10 **Modes for Carrying Out the Invention:**

FIGS. 1 – 11 show one embodiment of the card connector of the present invention. The embodiment shown has a pair of card slots and is configured to receive a relatively thin card in one of the card slots and a relatively thick card in the other card slot.

Referring to FIGS. 1 and 9, card connector 1 has a housing comprising a generally rectangular base plate 10, side walls 9 extending generally in parallel from opposite sides of base plate 10, and a top plate 41 extending generally parallel to base plate 10. Base plate 10 includes a plurality of mounting lugs 47 for mounting card connector 1 to a printed circuit board incorporated into an item of electronic equipment (not shown), using screws or other hardware.

Referring to FIGS. 2, 3 and 9, a guide groove 13 and a guide groove 11 are formed in each of side walls 9 and extend along the direction of card insertion indicated by arrow IX (FIG. 1). For convenience, guide groove 11 will be referred to as the “lower guide groove” and guide groove 13 will be referred to as the “upper guide groove”. It should be understood that such terms as “left”, “right”, “top”, “bottom”, “upper”, “lower”, etc., have been used in the description and claims to facilitate a concise description and better understanding of the invention. Such terms are not intended in any way to be limiting.

As seen in FIG. 9, upper guide grooves 13 formed in side walls 9 are arranged so as to be opposite each other to receive edges of a planar card. Similarly, lower guide grooves 11 formed in side walls 9 are arranged so as to be opposite each other. Each of upper guide grooves 13 has a relatively larger opening sized to receive a relatively thicker card (for example, a PCMCIA card), while each of lower guide grooves 11 has a relatively narrow opening sized to receive a relatively thinner card (for example, a SMART card).

Referring to FIGS. 1, 2 and 9, an intermediate plate 40 is positioned between base plate 10 and top plate 41 and extends generally parallel to base plate 10. Top plate 41, side

walls 9 (including upper guide grooves 13) and intermediate plate 40 combine to define an upper card slot 13A. Upper guide grooves 13 reside above intermediate plate 40, within upper card slot 13A. As upper guide grooves 13 have a relatively wider opening sized to receive thicker card 6, upper card slot 13A is configured to receive thick card 6. In addition, intermediate plate 40, side walls 9 (including lower guide grooves 11) and base plate 10 combine to define a lower card slot 11A. Lower guide grooves 11 reside below intermediate plate 40, within lower card slot 11A. As lower guide grooves 11 have a relatively narrow opening sized to receive thinner card 3, lower card slot 11A is configured to receive thin card 3.

Referring to FIGS. 3-8, a closure wall 12 encloses side end portions of upper card slot 13A and lower card slot 11A. Closure wall 12 may be formed from a synthetic resin. As seen in FIGS. 3-8, closure wall 12 is provided with connection pins 14 which establish an electrical connection between thick card 6 and card connector 1.

Referring to FIGS. 3, 4 and 9, upper card slot 13A is configured to receive end 100 of thick card 6 therein. However, a user may mistakenly insert end 102 of thick card into upper card slot 13A. To prevent this, connector 1 includes a mechanism 50 (FIG. 9) for preventing backwards insertion of thick card 6 into upper card slot 13A.

Referring to FIG. 9, mechanism 50 comprises a right side polarizing key 52 and a left side polarizing key 53 formed on inner surfaces of respective side walls 9 within upper card slot 13A. Although right side key 52 and left side key 53 have the same shape, left-side key 53 is positioned slightly above the level in upper card slot 13A at which right-side key 52 is positioned. As seen in FIGS 12 and 13, a pair of corresponding fitting grooves 54, 55 are formed on respective side peripheries of thick card 6 proximate end 100 of thick card 6 which is to be inserted into upper card slot 13A. However, no corresponding grooves are formed at opposite end 102 of thick card 6. Thus, when thick card 6 is inserted into upper card slot 13A, a right side key 52 is received in fitting groove 54 and left side key 53 is received in fitting groove 55. As no grooves are formed at opposite end 102 of thick card 6 for receiving keys 52 and 54 therein, keys 52, 54 will abut end 100 of thick card 6 if card end 102 is inserted into upper card slot 13A, thereby preventing full insertion of thick card 6 into upper card slot.

Referring to FIGS. 2-8, connector 1 also includes a selective stop mechanism for preventing full insertion of thin card 3 into upper card slot 13A. The selective stop mechanism comprises one or more components 17, each component 17 having a base portion 19, a stop member 106, and a spring portion 21 connecting stop member 106 to base portion 19. Base portion 19 of each component 17 is generally secured to a part of the connector that

is in communication with upper card slot 13A. In the embodiment shown in FIGS. 2-8, base portions 19 are positioned spaced apart and secured to intermediate plate 40 which defines a lower boundary of upper card slot 13A. A spring portion 21 extends from each base portion 19, sloping in a direction generally toward a top plate 41, which defines an upper boundary of upper card slot 13A.

A stop member 106 is affixed to a free end of each spring portion 21 and includes an engagement portion 104 for engaging either of thick card 6 or thin card 3 during insertion of the card into upper card slot 13A. As seen in FIG. 3, stop member 106 extends into a path of insertion of a card into upper card slot 13A so that the card will engage stop member 106 during insertion. As stop member 106 is affixed to a free end of spring portion 21 and is not secured to another portion of the connector, stop member 106 is movable within upper card slot 13A. Engagement portion 104 is spaced apart from top plate 41.

Stop member 106 also includes a stop portion 25 attached to engagement portion 104. Stop portion 25 projects from engagement portion 104 generally perpendicularly to abut top plate 41, which defines an upper boundary of upper card slot 13A. Generally, the length of stop portion 25 projecting from engagement portion 104 is determined such that a gap between engagement portion 104 and top plate 41 is smaller than the thickness of thin card 3.

As described above, base portion 19, spring portion 21 and stop member 106 form a cantilevered structure which define, in combination with top plate 41, an enclosure 110 configured to receive therein a portion of a card inserted into upper card slot 13A. Base portion 19, spring portion 21 and stop member 106 of component 17 may be integrally formed, for example by molding or stamping and forming.

Referring to FIGS. 3-4, operation of the selective stop mechanism during insertion of thick card 6 will now be discussed.

The stop mechanism of the present invention is selective in that it limits the degree to which a relatively thinner card may be inserted into a card slot configured to receive the thicker card, while still permitting full insertion of the thicker card into the card slot. Referring to FIG. 3, when thick card 6 is inserted into upper card slot 13A, thick card 6 engages spring portion 21 of stop mechanism 17. Referring to FIG. 4, as insertion of thick card 6 proceeds into upper card slot 13A, thick card 6 contacts engagement portion 104 of stop member 106 which forces spring portion 21 to resiliently rotate with respect to base portion 19. As stop member 106 is attached to spring an end of spring portion 21, rotation of spring portion 21 forces stop member 106 in a downward direction, thereby removing stop portion 25 from the path of insertion of thick card 6 and permitting insertion of thick card 6

into upper card slot 13A past stop member 106 into the normal insertion position of the card indicated by the chain double-dashed line.

Referring to FIGS. 5-8, operation of the selective stop mechanism during insertion of thin card 3 will now be discussed.

5 Referring to FIG. 5, when thin card 3 is inserted into upper card slot 13A in the direction indicated by arrow IX (see FIG. 1), card 3 engages spring portion 21 of locking mechanism 17. Referring to FIG. 6, as insertion of thin card 3 proceeds into upper card slot 13A, thin card 3 is urged upwardly by contact with spring portion 21, toward top plate 41 until card 3 contacts engagement portion 104 of stop mechanism 17. As the gap between
10 engagement portion 104 and top plate 41 is smaller than the thickness of thin card 3, card 3 will wedge between engagement portion 104 and top plate 41, causing a slight downward movement of stop member 106 away from the path of insertion of card 3. This produces a slight gap between stop portion 25 and top plate 41. As insertion of thin card 3 proceeds further into upper card slot 13A, card 3 comes into contact with stop portion 25. As the gap
15 created between stop portion 25 and top plate 41 is not large enough to permit thin card 3 to pass through, this contact between stop portion 25 and thin card 3 prevents further motion of card 3 into upper card slot 13A.

As may be seen from the above description and the drawings, when a card having a thickness greater than a certain predetermined thickness is inserted into upper card slot 13A,
20 contact between the card and spring portions 21 of stop mechanism 17 will cause spring portion 21 and stop member 106 to rotate out of the path of insertion of the card, thereby permitting insertion of the card past into a portion of the card slot residing beyond stop member 106. Also, when a card having a thickness less than the predetermined thickness is inserted into upper card slot 13A, rotational movement of the stop member will be
25 insufficient to move stop portion 25 out of the path of insertion of the card. In this case, stop portion 25 will engage the thinner card, preventing insertion of the card past stop mechanism 17.

Referring to FIG. 8, because the opening extending into upper card slot 13A is much larger than the thickness of thin card 3, card 3 may be inserted into upper card slot 13A at an
30 angle. As insertion of thin card 3 into upper card slot 13A proceeds into the card slot, thin card 3 contacts engagement portion 104 and top plate 41 such that a slight downward movement of stop member 106 away from the path of insertion is produced. Due to angular insertion of the card 3, the downward movement of stop member 106 may be slightly greater than the downward movement of the stop member produced during insertion of card 3 into

card slot 13A in the direction of arrow IX, as shown in FIG. 6; thus, the gap produced between stop portion 25 and top plate 41 may be slightly greater than in the previous case. As insertion of thin card 3 proceeds further into upper card slot 13A, card 3 comes into contact with stop portion 25. However, even where thin card 3 is inserted into upper card slot 13A at an angle, the gap between stop portion 25 and top plate 41 is not large enough to permit thin card 3 to pass through. Thus, engagement between stop portion 25 and thin card 3 prevents further motion of card 3 into upper card slot 13A.

Referring to FIG. 14, even in an instance where thin card 3 is forced past stop portion 25, thin card 3 will be forced into engagement with left and right side polarizing keys 52, 53 prior to coming into contact with pins 14 because the contact between thin card 3 and stop mechanism 17 during card insertion acts to bias thin card 3 toward stop member 106 and, therefore, toward top plate 41. Thus, thin card 3 will tend to slide along a lower face of top plate 41 if the card is inserted past stop mechanism 17.

Referring to FIG. 15, in an alternative embodiment, base portions 19 of stop mechanism 17 may be secured to a surface defining an upper boundary of upper card slot 13A. In this embodiment, stop mechanism 17 and intermediate plate 40 would form an enclosure 110 for receiving a portion of thin card 3 during card insertion. Also, contact between thin card 3 and stop mechanism 17 during card insertion will bias thin card 3 toward stop member 106 and, therefore, toward intermediate plate 40. Thus, thin card will tend to slide along an upper face of intermediate plate 40 if the card is inserted past stop mechanism 17. As pins 14 are spaced apart from intermediate plate 40 a distance greater than the thickness of thin card 3, thin card 3 will be unable to make contact with pins 14 even if the card is inserted past stop mechanism 17.

In another alternative embodiment (not shown), an loop may be formed from an elongated member (for example, a piece of wire) and positioned within upper card slot 13A to engage a corner of thin card 3 inserted into upper card slot 13A.

It should be understood that the preceding is merely a detailed description of various embodiments of this invention and that numerous changes to the disclosed embodiment can be made in accordance with the disclosure herein without departing from the spirit or scope of the invention. The preceding description, therefore, is not meant to limit the scope of the invention. Rather, the scope of the invention is to be determined only by the appended claims and their equivalents.

CLAIMS:

1. A card connector (1) comprising:
a housing defining a card slot (13A) adapted to receive a card (3, 6) therein;
the connector (1) characterized by a selective stop mechanism (17) secured to a
portion of the card connector (1), the stop mechanism (17) including a movable stop member
5 (106) positioned in a path of insertion of a card (3) into the card slot (13A) to engage the card
during insertion, thereby preventing insertion of the card (3) into the card slot (13A) past the
stop member (106);
wherein a card (6) having a thickness greater than a predetermined thickness inserted
into the card slot (13A) engages the stop member (106) to produce a movement of the stop
10 member (106) out of the path of insertion of the card (6), thereby permitting insertion of the
card (6) into the card slot (13A) past the stop member (106).
2. The card connector of claim 1 characterized in that the stop mechanism (17)
further includes a base portion (19) secured to the portion of the connector (1) and a spring
portion (21) extending between the base portion (19) and the stop member (106).
3. The card connector of claim 2 characterized in that the base portion (19),
spring portion (21) and stop member (106) are integrally formed.
4. The card connector of claim 1 characterized in that insertion of the card (6)
having a thickness greater than the predetermined thickness produces a rotation of the stop
member (106) about the base portion (19) and out of the path of insertion of the card (6).
5. The card connector of claim 1 characterized in that the stop member (106)
includes an engagement portion (104) spaced apart from a surface defining a boundary of the
card slot (13A) and adapted to be engaged by the card (3,6) during card insertion to produce a
movement of the stop member (106), and a stop portion (25) attached to the engagement
5 portion (104) and abutting a surface defining a boundary of the card slot (13A), wherein the
stop portion (25) is adapted to be engaged by the card (3,6) during card insertion to prevent
insertion of the card (3) into the card slot (13A) past the stop member (106).

6. The card connector of claim 5 characterized in that the stop portion (25) extends in a direction generally perpendicular to a direction of insertion of the card (3,6) into the card slot (13A).

7. The card connector of claim 1 characterized in that the stop mechanism (17) includes another movable stop member (106) spaced apart from the stop member (106) and positioned in the path of insertion of the card (3,6) into the card slot (13A) to engage the card (3,6) during insertion, thereby preventing insertion of the card (3,6) into the card slot (13A) past the other stop member (106), wherein the card (6) having a thickness greater than a predetermined thickness inserted into the card slot (13A) engages the other stop member (106) to produce a movement of the other stop member (106) out of the path of insertion of the card (6), thereby permitting insertion of the card (6) into the card slot (13A) past the other stop member (106).

8. The card connector of claim 7 characterized in that the stop mechanism (17) further includes another base portion (19) secured to the portion of the connector (1) and another spring portion (21) extending between the other base portion (19) and the other stop member (106).

9. The card connector of claim 1 characterized in that the stop mechanism (17) is secured to a surface in communication with the card slot (13A).

10. The card connector of claim 9 characterized in that the surface defines an upper boundary of the card slot (13A).

11. The card connector of claim 9 characterized in that the surface defines an lower boundary of the card slot (13A).

12. The card connector of claim 1 characterized in that the housing defines another card slot (11A).

13. The card connector of claim 12 characterized in that an opening in communication with the other card slot (11A) has a dimension which is less than the predetermined thickness.

14. A card connector (1) defining a card slot bounded by a pair of opposed surfaces (40, 41), the card connector (1) characterized by a stop mechanism (17) extending from one of the opposed surfaces (40,41) and abutting the other one of the opposed surfaces (40,41), the stop mechanism (17) and the other one of the opposed surfaces (40,41) defining an enclosure (110) adapted to receive a portion of a card (3) inserted into the card slot (13A) to prevent insertion of the card past the stop mechanism (17).

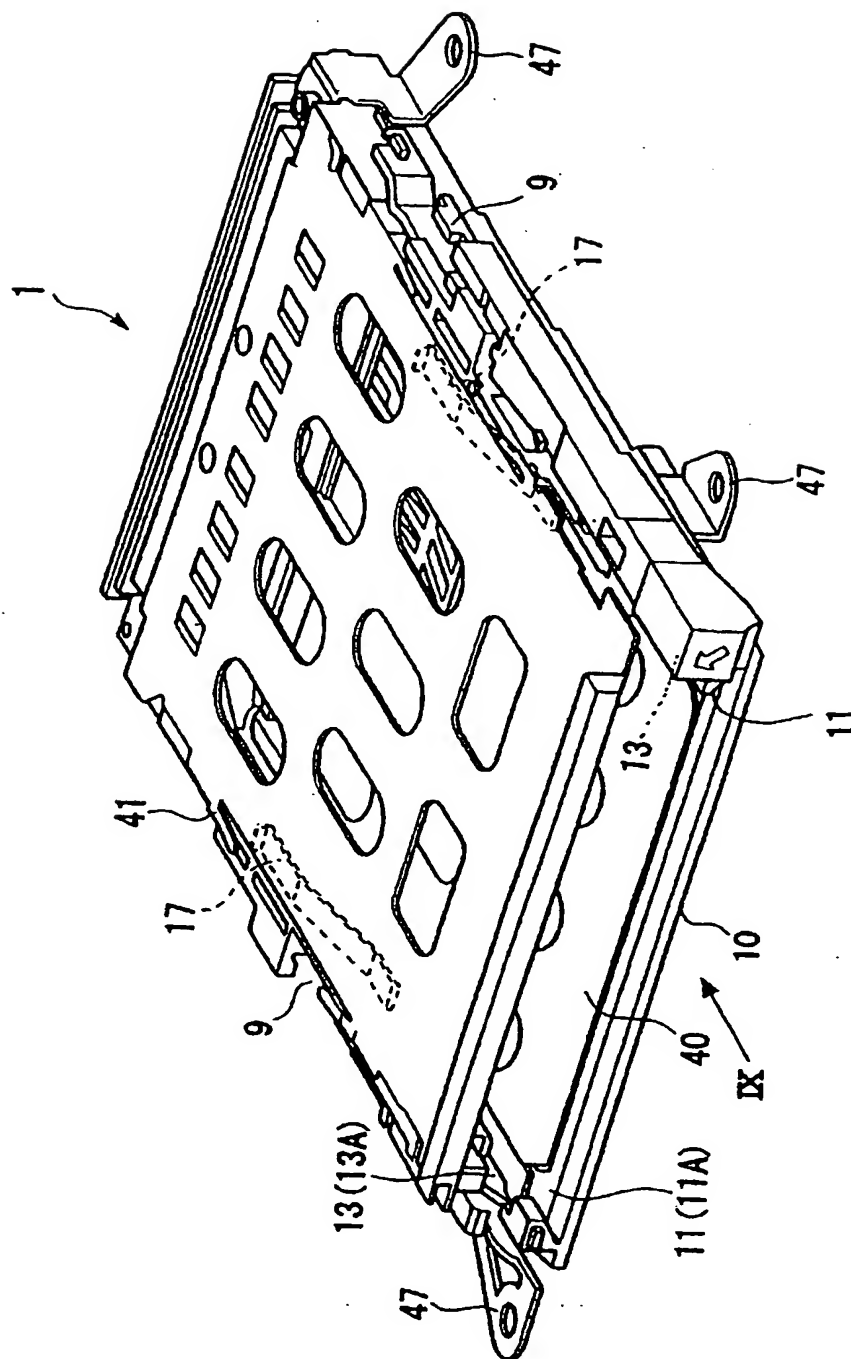
15. The card connector of claim 14 characterized in that a portion of the stop mechanism (17) extending from the one of the opposed surfaces (40,41) is adapted to contact the card during insertion to bias the card (3,6) in a direction toward the enclosure (110).

16. The card connector of claim 14 characterized in that the stop mechanism (17) has a cantilevered structure with a base portion (19) of the structure secured to the one of the opposed surfaces (40,41) and a free end of the structure abutting the other one of the opposed surfaces (40, 41).

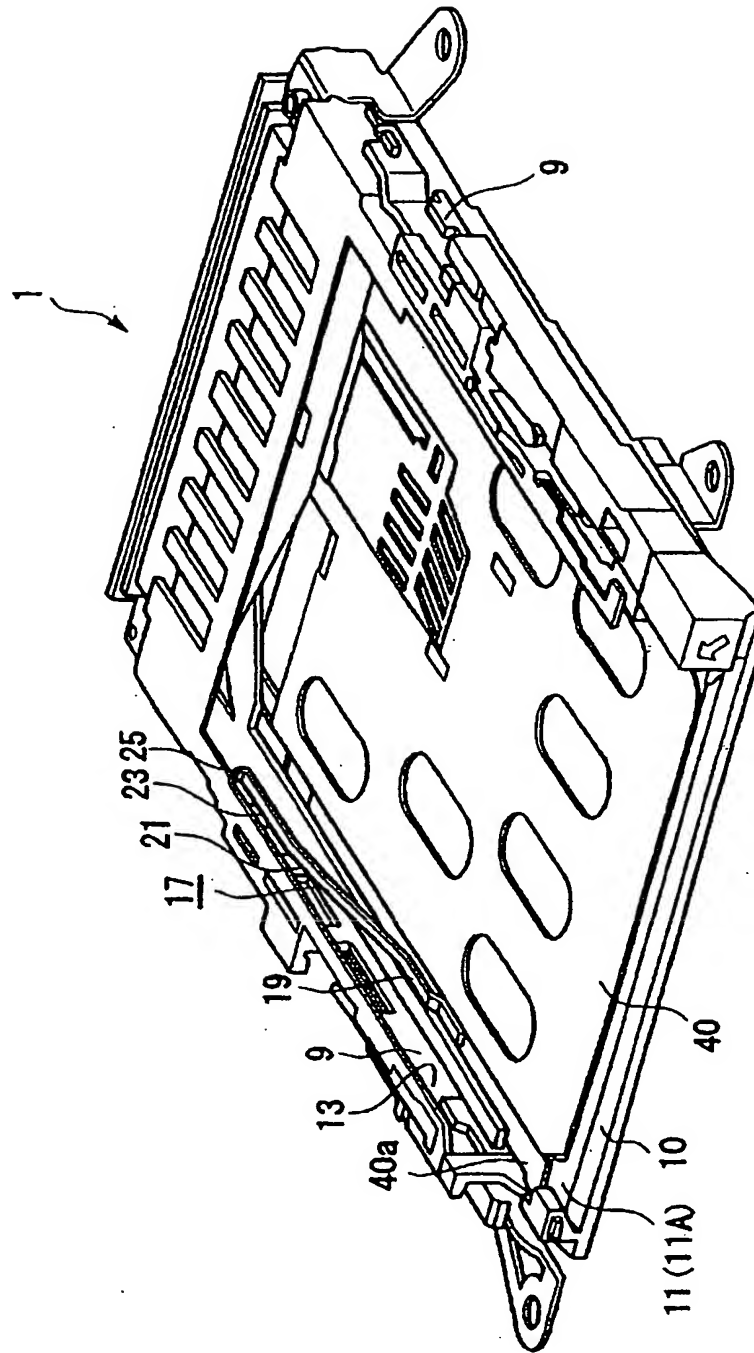
17. A card connector (1) comprising a housing defining a first card slot (13A) adapted to receive a first card (6) therein, a second card slot (11A) adapted to receive a second card (3) therein, the card connector (1) characterized by a movable stop mechanism (17) extending into the first card slot (13A) in a path of insertion of a card into the card slot (13A), the stop mechanism (17) including a stop member (106) adapted to engage the second card (3) during insertion of the second card (3) into the first card slot (13A) to prevent insertion of the second card (3) into a portion of the first card slot (13A), the stop member (106) being adapted to resiliently deflect out of the path of insertion of the first card (6) during insertion of the first card (6) into the first card slot (13A) to permit insertion of the first card (6) into the portion of the first card slot (13A).

18. The card connector of claim 17 characterized in that the first card (6) has a thickness greater than a thickness of the second card (3).

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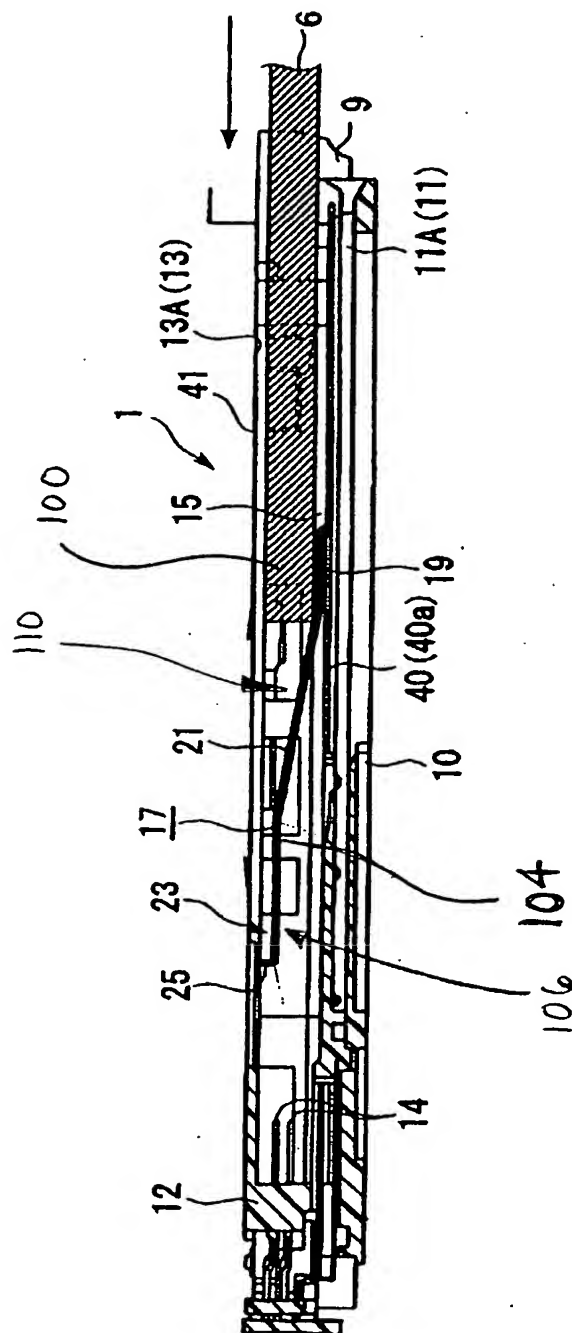
FIG. 1

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FIG. 2

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FIG. 3



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FIG. 4

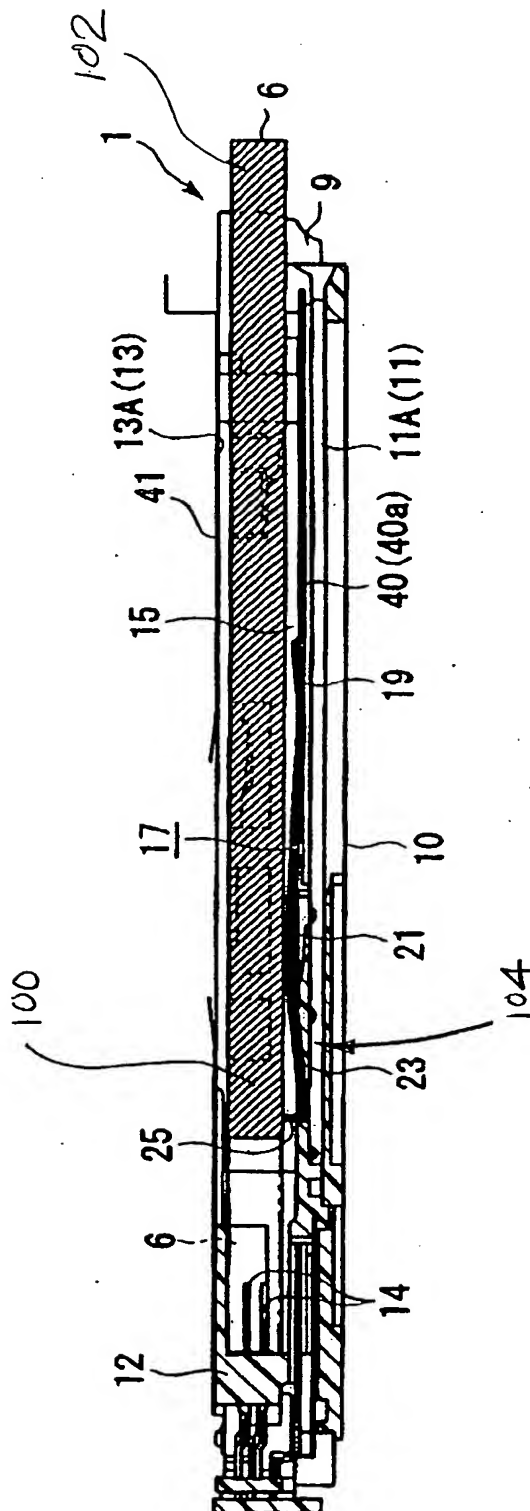
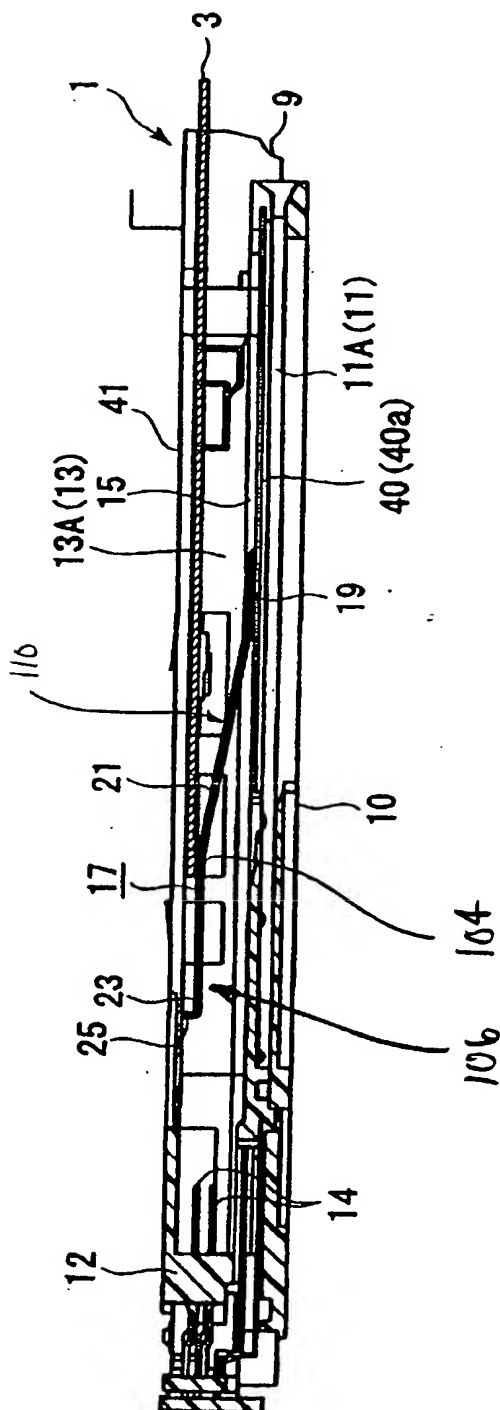


FIG. 6

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FIG. 8

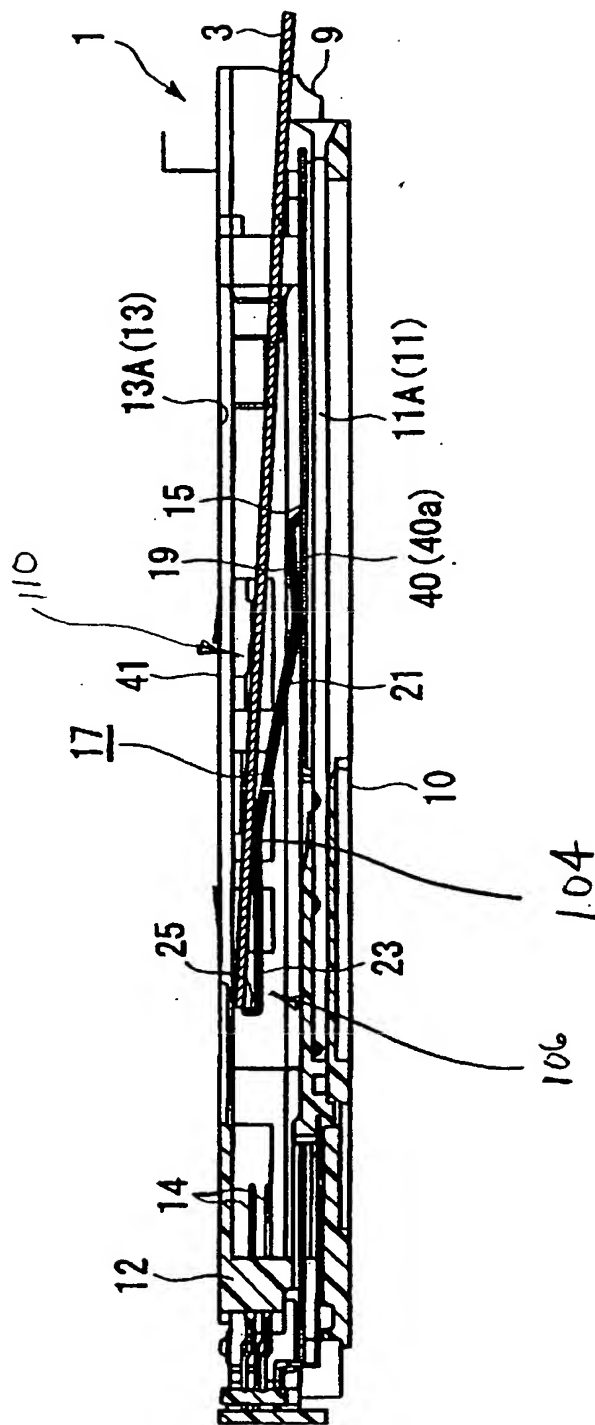
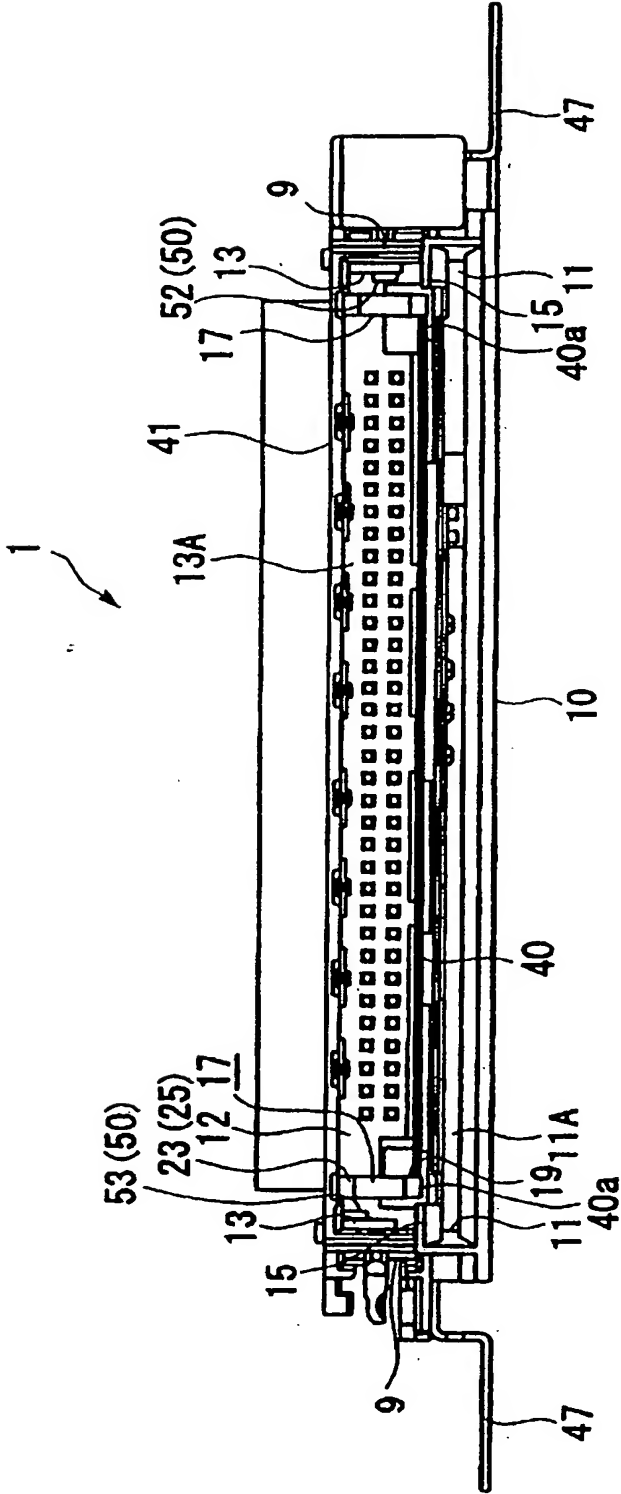
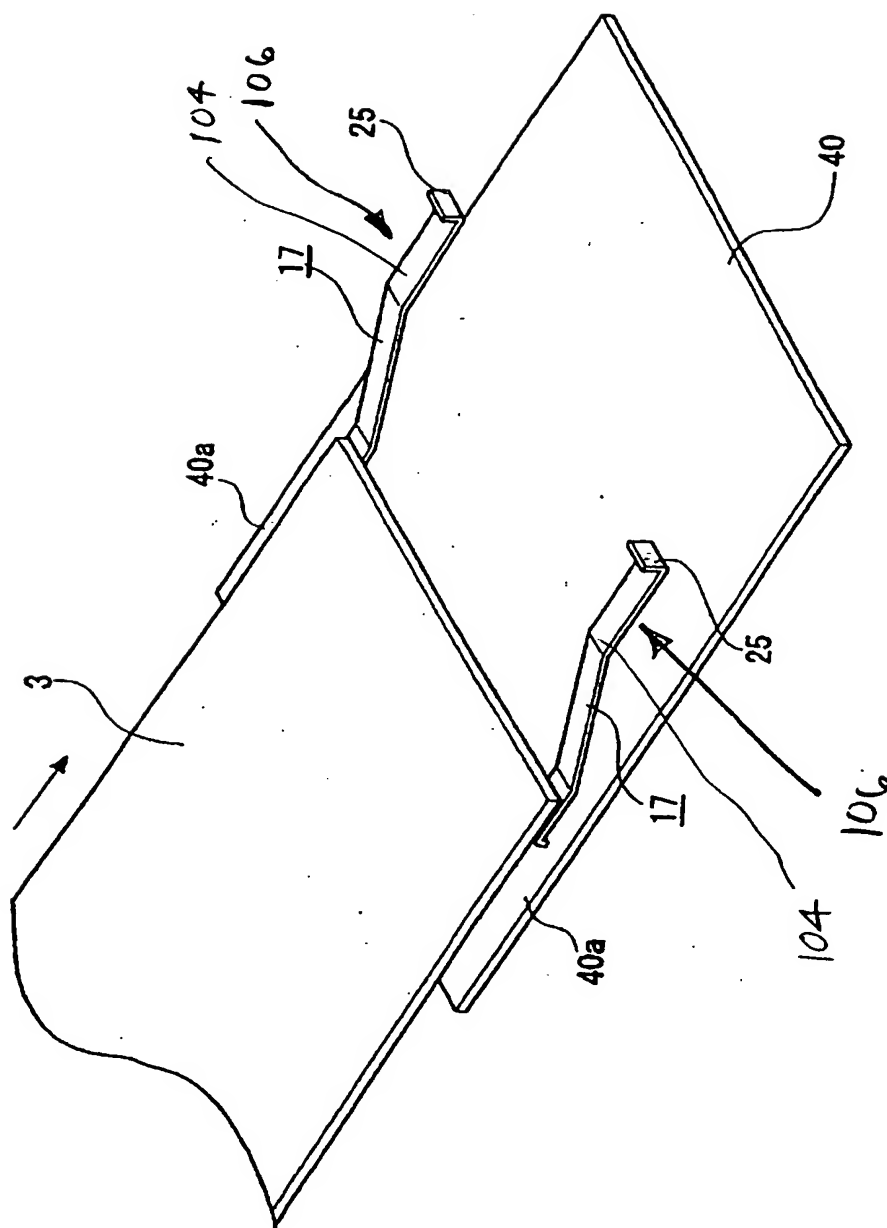


FIG. 9

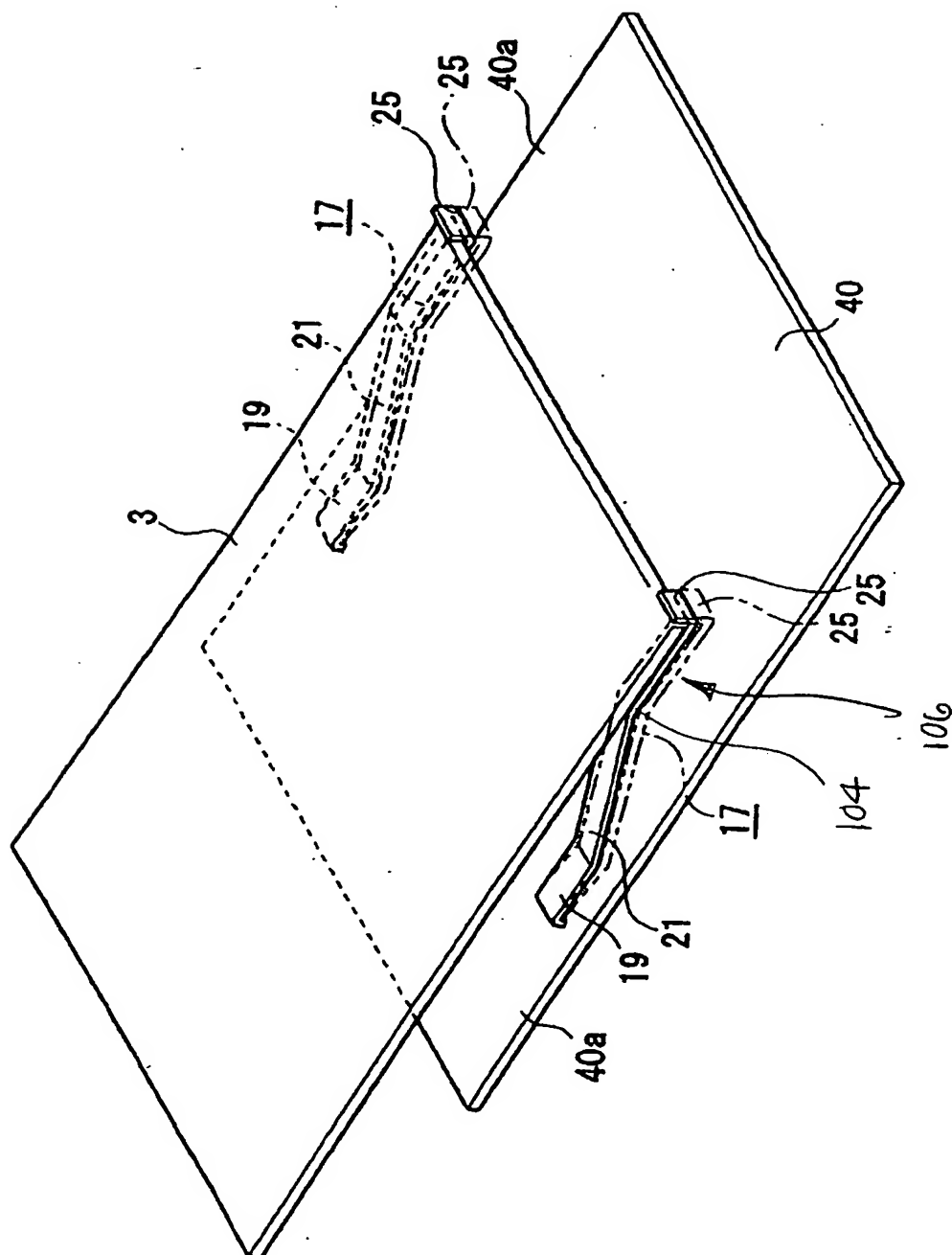


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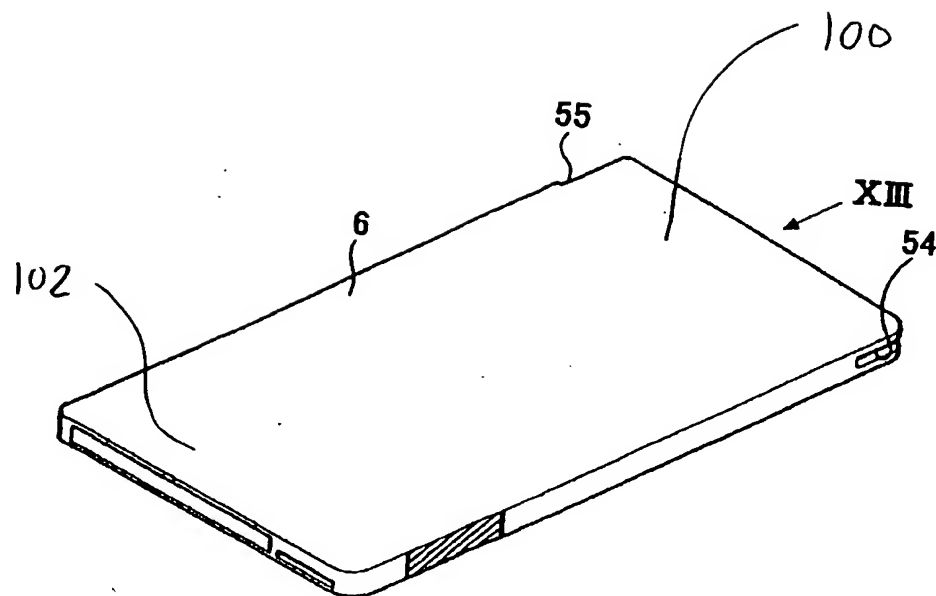
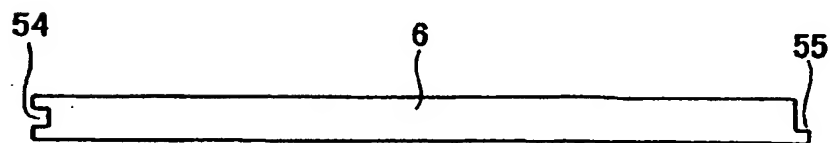
FIG. 10

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FIG. 11

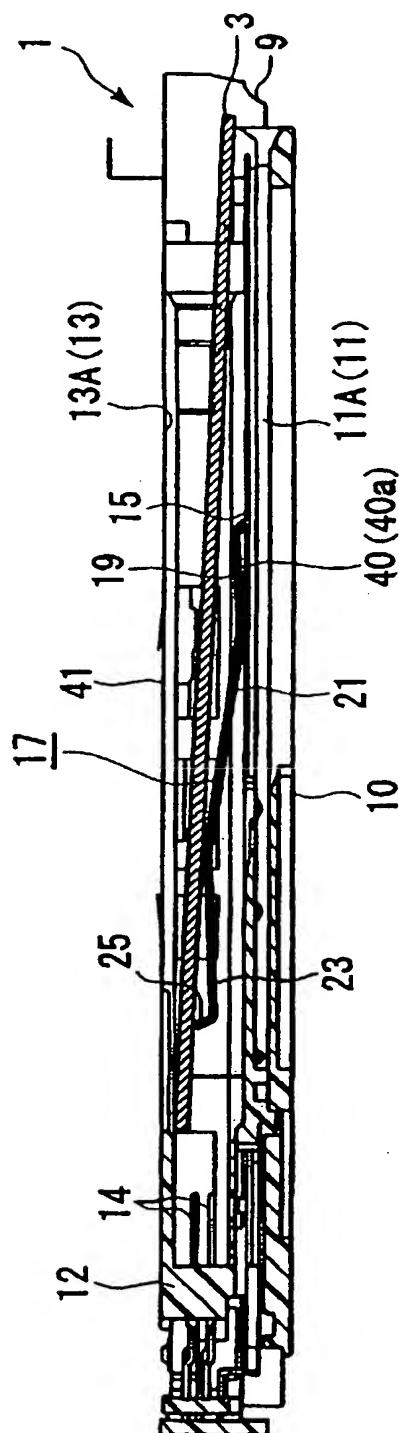


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FIG. 12**FIG. 13**

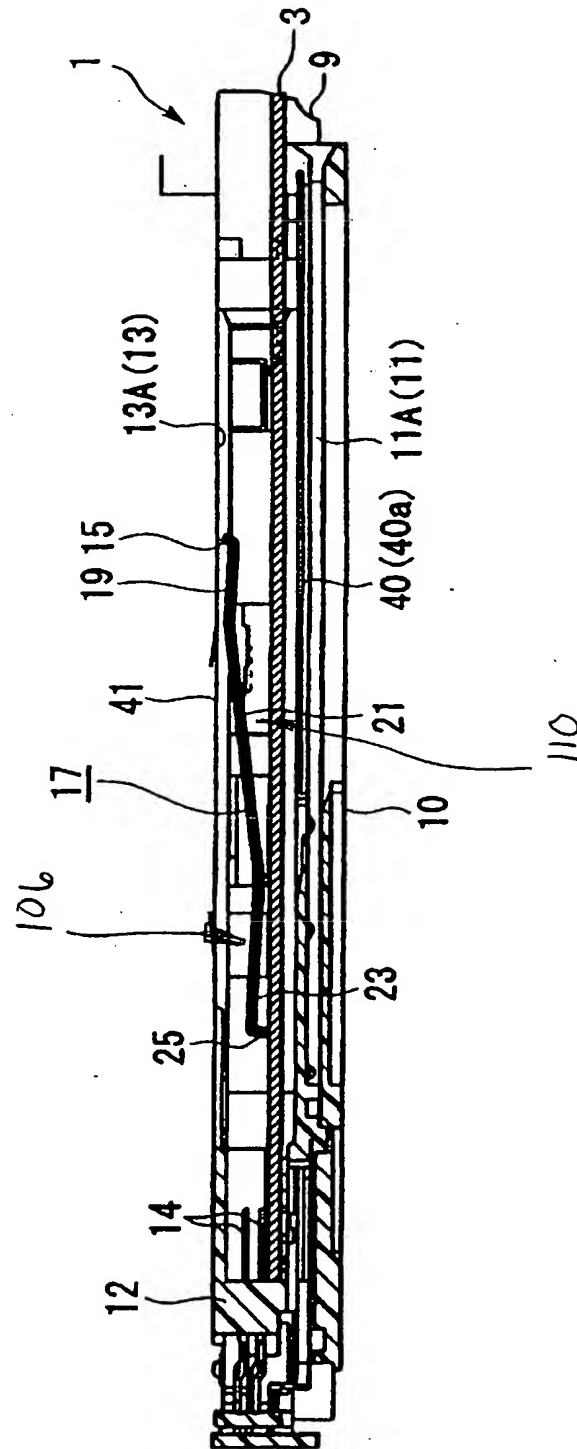
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FIG. 14

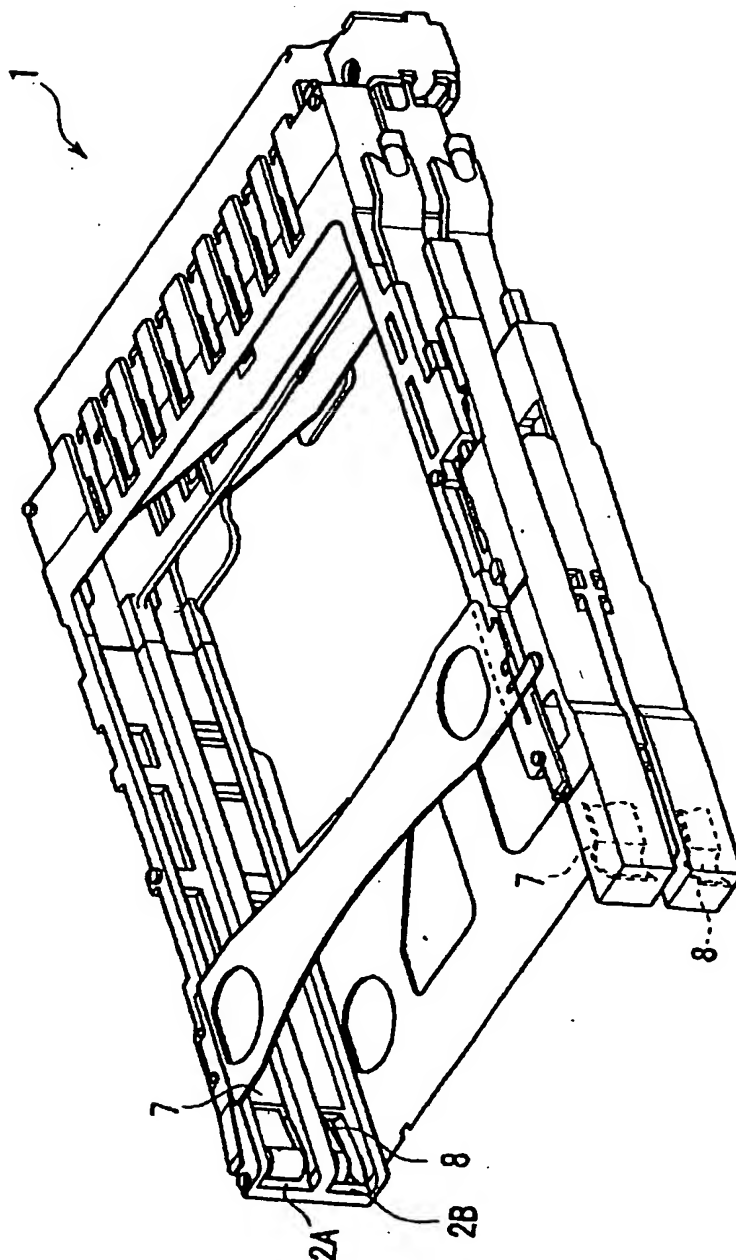


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FIG. 15



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FIG. 16

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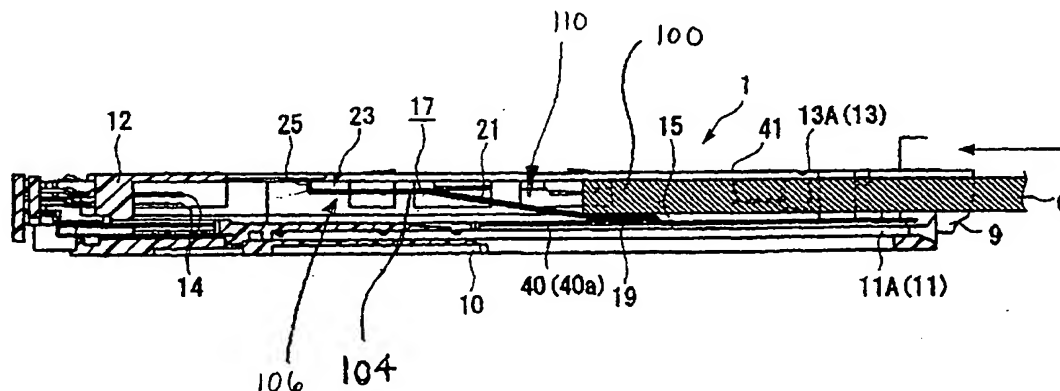
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(54) Title: **CARD CONNECTOR WITH SELECTIVE CARD STOP MECHANISM**



(57) Abstract: A stop mechanism (17) is disclosed for selectively restricting insertion of a card (3) into a card slot (13A) of a card connector (1). The stop mechanism (17) is positioned in the card slot along a path of insertion of the card into the card slot. A card (3) having a thickness less than a predetermined thickness engages a stop portion of the stop mechanism (17) when inserted into the card slot, preventing further insertion of the card past the stop mechanism (17). A card having a thickness greater than the predetermined thickness contacts an engagement portion (104) of the stop mechanism (17) when inserted into the card slot, producing a movement of the stop mechanism (17) out of the path of card insertion.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/20432

A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 563 397 A (FUJIMOTO OSAMU ET AL) 8 October 1996 (1996-10-08) column 6, line 25 - line 57 column 23, line 11 - column 24, line 14 column 26, line 10 - line 53 figures 28A, 28B, 30A, 30B, 30C, 30D	1-6, 9-11
Y	---	12, 13, 17, 18
Y	US 5 591 047 A (YAMADA SHOJI ET AL) 7 January 1997 (1997-01-07) column 3, line 34 - line 42; figures 9, 10 ---	12, 13, 17, 18
	-/--	

☒ Further documents are listed in the continuation of box C.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 05, 31 May 1999 (1999-05-31) & JP 11 039435 A (MATSUSHITA ELECTRIC IND CO LTD), 12 February 1999 (1999-02-12) abstract	1, 4, 9
A	----	17, 18
X	EP 0 831 413 A (HITACHI LTD) 25 March 1998 (1998-03-25) column 8, line 10 - line 26 column 8, line 43 - column 9, line 12 column 9, line 42 - line 53 figures 3, 4, 6	14-16
A	----	1, 17
A	FR 2 687 238 A (GEMPLUS CARD INT) 13 August 1993 (1993-08-13) page 6, line 9 - page 9, line 4; figures 1-5 -----	1, 2, 14

INTERNATIONAL SEARCH REPORT

International Application No.

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5563397	A	08-10-1996	JP 2660655 B2	08-10-1997
			JP 7175897 A	14-07-1995
			JP 3245671 B2	15-01-2002
			JP 9016833 A	17-01-1997
			US 5508501 A	16-04-1996
US 5591047	A	07-01-1997	JP 6056992 U	05-08-1994
			DE 69320016 D1	03-09-1998
			DE 69320016 T2	17-12-1998
			EP 0605204 A2	06-07-1994
			US 5490791 A	13-02-1996
JP 11039435	A	12-02-1999	NONE	
EP 0831413	A	25-03-1998	JP 10097599 A	14-04-1998
			AU 696489 B2	10-09-1998
			AU 3837697 A	26-03-1998
			CA 2213042 A1	24-03-1998
			EP 0831413 A2	25-03-1998
			US 6189786 B1	20-02-2001
			US 6010066 A	04-01-2000
FR 2687238	A	13-08-1993	FR 2687238 A1	13-08-1993

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GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC,
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ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
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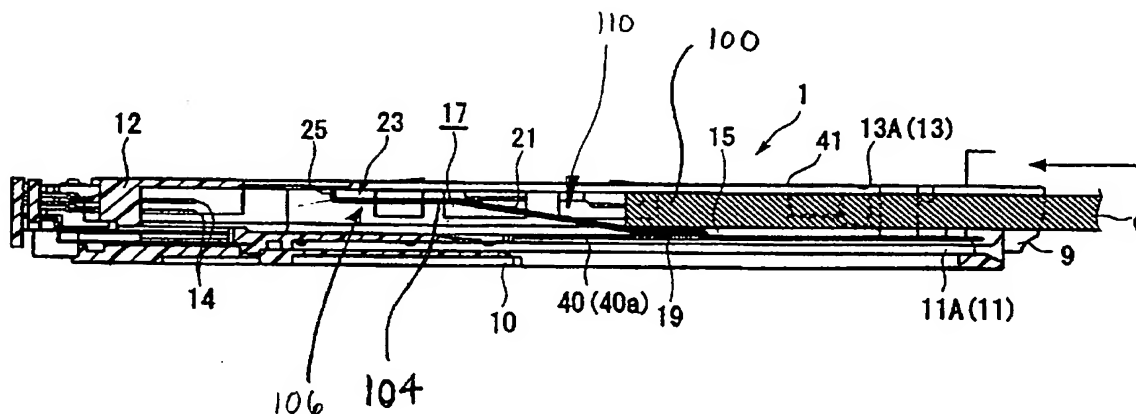
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(54) Title: CARD CONNECTOR WITH SELECTIVE CARD STOP MECHANISM



(57) Abstract: A stop mechanism (17) is disclosed for selectively restricting insertion of a card (3) into a card slot (13A) of a card connector (1). The stop mechanism (17) is positioned in the card slot along a path of insertion of the card into the card slot. A card (3) having a thickness less than a predetermined thickness engages a stop portion of the stop mechanism (17) when inserted into the card slot, preventing further insertion of the card past the stop mechanism (17). A card having a thickness greater than the predetermined thickness contacts an engagement portion (104) of the stop mechanism (17) when inserted into the card slot, producing a movement of the stop mechanism (17) out of the path of card insertion.

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AMENDED CLAIMS

[received by the International Bureau on 05 March 2004 (05.03.2004);
original claims 1-9 amended; remaining claims unchanged (3 pages)]

CLAIMS:

1. A card connector (1) comprising:
a housing defining a card slot (13A) adapted to receive a card (3, 6) therein;
the connector (1) comprising a selective stop mechanism (17) secured to a portion of the card connector (1), the stop mechanism (17) including a movable stop member (106) positioned in a path of insertion of a card (3) into the card slot (13A) to engage the card during insertion, thereby preventing insertion of the card (3) into the card slot (13A) past the stop member (106);
wherein a card (6) having a thickness greater than a predetermined thickness inserted into the card slot (13A) engages the stop member (106) to produce a movement of the stop member (106) out of the path of insertion of the card (6), thereby permitting insertion of the card (6) into the card slot (13A) past the stop member (106),
characterized in that the stop mechanism (17) includes another movable stop member (106) spaced apart from the stop member (106) and positioned in the path of insertion of the card (3,6) into the card slot (13A) to engage the card (3,6) during insertion, thereby preventing insertion of the card (3,6) into the card slot (13A) past the other stop member (106), wherein the card (6) having a thickness greater than a predetermined thickness inserted into the card slot (13A) engages the other stop member (106) to produce a movement of the other stop member (106) out of the path of insertion of the card (6), thereby permitting insertion of the card (6) into the card slot (13A) past the other stop member (106).
2. The card connector of claim 1 characterized in that the stop mechanism (17) further includes another base portion (19) secured to the portion of the connector (1) and another spring portion (21) extending between the other base portion (19) and the other stop member (106).
3. The card connector of claim 1 characterized in that the housing defines another card slot (11A).
4. The card connector of claim 3 characterized in that an opening in communication with the other card slot (11A) has a dimension which is less than the predetermined thickness.

5. A card connector (1) defining a card slot bounded by a pair of opposed surfaces (40, 41), the card connector (1) characterized by a stop mechanism (17) including a movable stop member (106) extending from one of the opposed surfaces (40,41) and abutting the other one of the opposed surfaces (40,41), the stop mechanism (17) and the other one of the opposed surfaces (40,41) defining an enclosure (110) adapted to receive a portion of a card (3) inserted into the card slot (13A) to prevent insertion of the card past the stop mechanism (17).

6. The card connector of claim 5 characterized in that a portion of the stop mechanism (17) extending from the one of the opposed surfaces (40,41) is adapted to contact the card during insertion to bias the card (3,6) in a direction toward the enclosure (110).

7. The card connector of claim 5 characterized in that the stop mechanism (17) has a cantilevered structure with a base portion (19) of the structure secured to the one of the opposed surfaces (40,41) and a free end of the structure abutting the other one of the opposed surfaces (40, 41).

8. A card connector (1) comprising a housing defining a first card slot (13A) adapted to receive a first card (6) therein, a second card slot (11A) adapted to receive a second card (3) therein, the card connector (1) characterized by a movable stop mechanism (17) extending into the first card slot (13A) in a path of insertion of a card into the card slot (13A), the stop mechanism (17) including a stop member (106) adapted to engage the second card (3) during insertion of the second card (3) into the first card slot (13A) to prevent insertion of the second card (3) into a portion of the first card slot (13A), the stop member (106) being adapted to resiliently deflect out of the path of insertion of the first card (6) during insertion of the first card (6) into the first card slot (13A) to permit insertion of the first card (6) into the portion of the first card slot (13A).

9. The card connector of claim 8 characterized in that the first card (6) has a thickness greater than a thickness of the second card (3).